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The Value of Civil Defense

(Addendum to S/CST Contribution to Project CO.2870 "Power Positions")

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The Value of Civil Defense

I. The results of civil defense preparations or of their lack may be divided between: (1) effects in actual war, and (2) effects in periods of no major war.

II. Effects of Civil Defense Preparations in Wartime.

If a nation is to survive the delivery of a major nuclear attack, advance civil defense preparations are mandatory.

A. The quantitative value of civil defense in presently possible warfare is complicated by many variables in weapons, delivery systems, active air defense, and in the civil defense measures taken. A number of studies,* however, have been prepared examining the advisability of civil defense preparations for the United States. All the studies seen here, (e.g., Rockefeller, Rand, Stanford, Johns Hopkins, Industrial College), conclude that civil defense preparations have value, and should be undertaken. No serious study is known -- here or in USSR -- which concludes that civil defense preparations do not have value.

B. As to civil defense in nuclear war, the studies agree that a civil defense system, including shelter, will save many millions of lives and insure or accelerate post-attack recuperation. The rate of casualty reduction varies considerably with the postulated attack and the shelter made available.**

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* See Tabs A through E.

** See Figure 1, Following p. 1.

Figure 1.

THE DIFFERENCE THAT SHELTERS MAKE

These estimates of U.S. casualties in a thermonuclear war do not represent predictions of Russian capabilities; they are forecasts of what would happen if the Russians were able to deliver on target enough bombs to destroy all buildings in fifty, or 150, urban areas, and also to destroy all SAC bases. Also, "no civil defense" means literally that—i.e., it assumes something less even than our present effort. The data are from Report on a Study of Non-Military Defense published by the Rand Corporation.

Millions of U.S. Fatalities out of 180 Million Population

50-city attack	30-60 minutes' warning	3-6 hours' warning
No civil defense	90	90
System of fallout shelters plus arrangements for tactical evacuation*	70	30
Same as above, after strategic evacuation*	25	5

150-city attack	30-60 minutes' warning	No warning for 10 biggest cities; 3-6 hours for all others
No civil defense	160	160
System of fallout shelters plus arrangements for tactical evacuation*	85	60
Same as above, after strategic evacuation*	40	25
System of blast and fallout shelters plus arrangements for rapid entry	25	25
Same as above, after strategic evacuation*	5	5

* Tactical evacuation comes after warning of an attack, strategic evacuation before the warning.

Recuperability, of course, depends on more than just personnel survival. It also depends on such defense mobilization measures as protection of industry, stockpiling, secure communications, the preservation of a minimum fiscal structure, an emergency control organization, and the like.

With no civil defense (according to a Rand study), a 300-city thermonuclear attack might leave only 20,000,000 American survivors and perhaps 30 percent of U. S. fixed capital.

C. A secondary war-time effect, resulting from advance civil defense and mobilization preparations, is that the attacking force would be obliged to use additional weapons and delivery vehicles in achieving any desired level of damage to population and industrial targets.

D. If civil defense preparations include (1) a workable organization, (2) the protection of leading personnel, and (3) secure communications system, the ability to exercise control and continue the direction of a war effort should be enhanced.

III. Values of Civil Defense in Period of No Major War.

A. Deterrent.

U.S. policy makers and those who have investigated civil defense agree that the existence of an effective civil defense system would be part of the power position deterring a potential aggressor. President Eisenhower recently stated, "Along with our military defense and retaliatory forces, civil defense and defense mobilization are vital parts of the nation's total defense -- together they stand as a strong deterrent to war."

A corollary has also been variously expressed to the effect that, with little or no civil defense for its own people, a nation would be strongly deterred from making a decision to initiate war with another nuclear power.

B. Affects on International Relations.

In addition to the deterrent force above, another effect in situations of tension would be to weaken the negotiating position of the country having little or no civil defense.

Firmness on the part of a leading nation and its allies in the face of aggressive threats from another nuclear power does not appear realistic without civil defense preparations.

Popular support of a policy of firmness can only diminish in a country without civil defense, when that country is faced by the possibility of war with a power having nuclear weapons and the means of delivery. Allies, too, might become increasingly doubtful about the final fulfillment of commitments to go to their aid -- risking nuclear war -- by a nation substantially lacking in civil defense.

Early this year, Secretary Herter specifically quoted a report which states:

"There is an enormous difference in the bargaining ability of a country which can, for example, put its people in a place of safety in 24 hours' notice, and one which cannot. If it is hard for the reader to visualize this, let him imagine a situation where the Russians had done exactly that and we had not. Then let him ask himself how he thinks we would come out at a subsequent bargaining table."

In a similar vein, Deputy Secretary of Defense, J. H. Douglas said, "Better protection of our civil population will strengthen the conviction and credibility of our firm policy to meet aggression with force."

C. Other Possible Effects.

1. It has already been mentioned that lack of civil defense could adversely affect a nation's will to resist, because of fear on the part of the population. It seems probable that active civil defense preparations would strengthen the public's will to resist, and increase public support for a policy of firmness.

2. Morale of the armed forces should be increased by assurance that there was at least a mathematical chance that their families could survive in major war.

3. Active preparation for civil defense may serve as an outlet for "nuclear" anxiety and identify the government and population in a cooperative effort against a common enemy. This device seems particularly tailored as an asset in the Communist Bloc. There, the civil defense training program for the population includes propaganda against the West as a potential aggressor. This propaganda reaches a large portion of the population even in times when "peace" and "coexistence" are the themes stressed in popular news media.

4. If it were sensationally publicized* that the Soviet Bloc had made long-term civil defense preparations, the effect on public morale in the U.S. might be adverse. Information for such an article seems now available in the

* For example in a magazine with national circulation.

West, and the Soviets could themselves release or cause to be released additional data. The picture of a USSR first in civil defense, whether exaggerated or not, would do little to reassure the American public in a period of growing Soviet missile capabilities.

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Defense of the U.S. Against Bombers and Missiles

Semiannual Report, Vol. X, No. 1, 1 January-30 June 1957. Operations Research Office, Johns Hopkins University.

1. Type of Study: Investigates Soviet capabilities for attacking the United States up to 1966 and U.S. capabilities for deterring an attack or winning the war if it comes. ("Winning the war" implies both defeat for the USSR and survival of the U.S. with "most" of its citizens unhurt and "most" of its resources undamaged.)

2. Attitude and Argument: Writers of this report stress the importance of defense of our retaliatory forces, and of U.S. cities and manufacturing. Air defense (including civil defense) is then roughly weighed in the power equation and it is implied that equal offensive capabilities but unequal defensive capabilities will give the balance of power to the side with the best defensive arrangements.

3. Civil Defense.

a. Example: Washington, D. C., hit by two 10 megaton bombs with CEP of 4,000 meters.

Deaths expected:

Best Shelter Now Available	71%
Evacuation - 1 hour warning	51%
Special Shelter	26%

(Special shelter is defined as that offering as much protection as an underground shelter covered with three feet of earth.) (p. 38)

b. Needed Measures: "Since active defenses cannot offer complete protection against surprise attack, we have to rely on passive means as well. OMO's findings with respect to hardening SAC bases and ICBM launch sites -- that is, making them blast resistant -- have already been noted. Here are others:

1. We cannot expect to protect people by evacuating them from likely target areas. For one thing, as noted earlier, warning times will be too short; for another, evacuation may take people into areas heavily contaminated with fallout.

2. Of all possible civil defense measures, the provision of special shelter offers the best hope of saving lives. Most people may have to take whatever shelter against blast and heat they can quickly find, then move to permanent shelter against fallout. All urban buildings, therefore, should have temporary shelters, with provision for occupancy up to 3 days. Permanent shelters should be equipped and stocked for at least a 2-week occupancy.

3. Generally it seems wise to spend shelter money primarily for protection against fallout radiation, mainly in urban areas, and secondly against blast over-pressures (up to 30 psi rather than beyond.)

4. If we have strong active defenses, we can have an effective shelter program at a reasonably moderate cost -- up to $15 billion over an 8-year period. If we do not have strong active defenses, even a much costlier shelter program will not enable us to survive and fight back.

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International Security -- The Military Aspect

America at Mid-Century Series, Panel Report II, Special Studies Project, Rockefeller Brothers Fund, Inc., 5 January 1958.

1. Type of Study: This is an examination of U.S. security policy and operations and recommendations for change.

2. Attitude and Argument: (Regarding Civil Defense.) Civil defense, "long overdue" is part of overall strategic posture affecting the national will, deterrence, and vulnerability.

3. Civil Defense Effectiveness: Study admits limitations in scope and notes only that fallout shelters could "substantially" reduce casualties.

Further study is recommended of heavier shelters for urban concentration.

4. Recommendations: "The major difficulty with civil defense has been our failure to treat it as an integral part of our defense planning. The first step will have to be to construct an attack-proof radio-net, and to begin on a program of fallout shelters. Fallout shelters are more feasible than blast shelters because they are easier to construct and because the population does not need to enter them until after an enemy attack has in fact occurred. Thus in most areas a warning time of 45 minutes could be counted on. The shelter program should be carried out with a maximum degree of cooperation with local and state authorities.

In addition to the protection of the population against fallout, provision should be made for the post-attack period. It will be highly important to plan on centers of administration and government. Stockpiling food supplies

and industrial reserves in safe places will prevent famine and enable the early resumption of economic activity. At the same time a continuation of organized activity will be aided by the greatest possible degree of dispersal of industry. It would be too costly to disperse existing industrial installations but tax incentives could be provided for the location of new facilities away from main concentrations.

While engaging in a civil defense at home, we must be prepared to assist our allies in similar efforts. Nothing would demonstrate better our basic concern for the security of our allies than a readiness to cooperate in the protection of their populations.

The main feature to note with respect to civil defense is that it is overdue. It does not make sense for the free world to engage in a major military effort without at the same time protecting its most important resource: its civilian population." (p. 70, 71)

Major Implications of a Current Non-Military Defense Study

Herman Kahn, Rand Corp. Report S-1497-RC, Revised November 7, 1958. U.

1. Type of Study: Review and discussion of non-military (including civil) defense preparations based on the findings of larger Rand Report (R-322-RC, 1 July 1958).

2. Attitude and Argument: Mr. Kahn, perhaps the most vociferous advocate of civil defense preparations argues, (1) that national policy should include the ability for the U.S. to win and survive a war as well as to deter it, (2) that thermonuclear war would be a catastrophe whose limits might be sharply dependent on pre-war measures, and (3) that feasible combinations of military and non-military defense measures may come pretty close to preserving a reasonable semblance of U.S. pre-war society.

3. Civil Defense Effectiveness: "There are a number of combinations of military and non-military measures which could provide valuable levels of protection in a nuclear war. The level of protection depends on the cost of the program and the circumstances of attack. Inexpensive measures designed to insure national survival in an all-out war of the early '60's might be fairly cheap and relatively reliable - something of the order of a billion dollars or a fraction thereof should be sufficient. More complete programs, designed to protect more than the most easily protected people, would be more expensive. Because such programs cost in the tens of billions of dollars, they are automatically controversial. However, we believe that at least the inexpensive programs should be carried out - so that if a war should occur the majority*

* S/CSI Underline.

of our population would not only survive the war but would be able to restore some semblance of prewar society quite rapidly. In a war of the early '70's even minimum measures to insure survival might be expensive (in the tens of billions) and probably less reliable. (Cost and performance change with time because the enemy threat changes.) However, at least a start should be made in preparing such measures.

Oversimplifying a bit one can say that against a premeditated all-out surprise attack, moderate non-military defense programs,* if combined with reasonable military programs, should protect about half the population with high confidence, an additional one-fourth with medium confidence, and a final one-fourth with low confidence during this 1960-70 period. A properly phased program might start with relatively cheap measures for the 1960 threat, develop into a minimum fallout program, and then possibly later into a quite adequate or 'luxurious' program which included blast shelters. While the planning should be done on this basis, there need be no irrevocable commitments to go ahead with the next phase if for any reason it seemed desirable to slow the program down or stop it.

It should be noted that wars can start in a manner other than a premeditated all-out surprise attack, and in many of these cases even the incomplete programs might be very effective. Therefore, even if we are not willing to pay the cost for complete preparedness, we might be willing to initiate partial programs. These partial programs could be combined with pre-war mobilization capabilities designed to put in an adequate program in

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* S/CSP Underline.

a few years if the international situation deteriorates. It is plausible to consider such pre-war mobilization capabilities because a country with a GNP of about $500 billion and a construction industry whose capacity is close to $100 billion can contemplate doing things in a hurry if cheap but time-consuming preliminaries such as these involved in research, development, planning, analysis, design, programming, and legal hurdles have been eliminated.

In addition to protecting people from the immediate effects of the war it is necessary to survive in the post-war environment and then to restore pre-war standards of living if possible. Our study indicated that:

Shelters with long occupancy time and the use of known anti-contamination techniques should make it possible to handle the acute radiation problem (during the first three months) from even severe attacks.

With only moderate preparations in the early period and more elaborate ones in the later, it should be possible to handle short-term (3-24 months) survival, patchup and repair problems.

Combinations of military and non-military measures could protect enough capital to enable the economy to be restored to about half the pre-war levels in the first year. The recuperation to pre-war levels might be much faster (5-15 years) than has been generally supposed. In any case, if reasonable measures were taken the economy, on a per capita basis, would in all probability not drop below 1930-1940 levels, except perhaps in the first post-war year.

Long-lived radioactivity problems, while serious, could be alleviated to the extent that, in comparison with the direct effects of the war, they would have a relatively minor impact on the economy or personal life of the population. Subject to uncertainties, the same should be true of the genetic effects. Even though these may last for a thousand years, the burden on any single generation should only be a fractional increase over the current normal burden of defects." (p. 2-5)

4. Suggestions: "...we suggest that it would be reasonable for the U.S. to spend about $500 million in the next two or three years, over and above current budgets, to achieve the following objectives.

a. Creation of incomplete but worthwhile capabilities, by reorienting and strengthening the current civil defense programs to achieve feasible capabilities utilizing evacuation, improvised fallout protection, damage control measures, modest preparations for recuperation and, given those other measures, a vigorous program of education and technical assistance to private parties and organizations. Some very cheap measures might save from 20 to 50 million lives, limit the contingent damage to property, markedly facilitate our ability to recuperate and provide an environment in which private people can do sensible things on their own to increase their chances of survival.

b. Research and development on all important aspects of the art of non-military defense. Unlike research and development on military matters, non-military defense has received comparatively little money and effort. In particular, the little work this study did indicated that imaginative work could not only result in large improvements in the effectiveness of defense measures but would uncover many unsuspected problems that would otherwise be very unpleasant surprises.

5. The vulnerability of our industrial base can be steadily lowered by putting up new facilities away from the big cities. Official measures that would create a bias in favor of dispersal might include pressure for dispersal by Federal procurement agencies in all contracts involving new plant construction, special consideration for dispersed facilities in tax amortization cases, and a Federal defense tax on all new physical capital development in big cities." (p. 39)

4. Civil Defense Recommendations: "Passive Defenses centered on a nationwide urban shelter program to offer protection against radiation and blast (30 psi) and provide for at least 2 weeks of occupancy could save many lives. Such measures as the hardening of SAC bases and the dispersal of military stocks and of new industrial construction could greatly reduce the vulnerability of essential military resources." (p. 55)

"The army should lend most vigorous influence and support to the following measures requiring joint or unilateral action by other services or agencies:...

Initiation of a shelter system at an expenditure rate of at least $2 billion per year for the next 5 years." (p. 60)

c. Accompanying the research and development work there should be a vigorous effort on the systems design of various combinations of military and non-military defense. The effort should end up with the specification and phasing of many alternative programs. These should be detailed enough to be costed and to permit the performance to be calculated over time under many circumstances. Paper planning and design should be undertaken for a number of the alternatives specified so that any program finally adopted would be less costly and have its lead-time reduced (by perhaps 3 to 5 years over conventional methods of proceeding).

d. While it is technically feasible to start a large-scale program of non-military defense now, there are many uncertainties and gaps in our knowledge. After objectives b and c have been accomplished, the proper balance between military and non-military expenditures can be studied. The government could then make much wiser decisions and some of the difficulties resulting from a combination of ignorance and uncertainty would be eliminated or decreased. The decision to go ahead or not go ahead with a multi-billion-dollar program should not be made until objectives b and c have been carried out.

e. Irrespective of any decision to go into multi-billion-dollar programs, inexpensive preparatory actions, which could result in the creation of very important capabilities in the 1965-70 time period, should be studied; if and when such actions are found desirable they should be put into practice." (p. 12, 13, 14)

"The Active Role of Passive Defense"

R. Cannell, (Manager, Industry and Civil Defense Research, SRI), Journal, Stanford Research Institute, Vol. 3, Fourth Quarter, 1959.

1. Type of Article: Discussion of feasibility and advisability of non-military defense measures.

2. Attitude and Argument: The writer advocates balanced forces, particularly emphasizing the need for non-military defense measures. He stresses the need for civil defense as protection for the population and foundation for recovery, and as a deterrent factor.

3. Civil Defense.

a. Example: "The United States has the technical know-how to provide the protection needed to save 90 percent of the population in nuclear war. In 1958, a recent report stated, 'Postponement of basic shelter construction is not warranted in our judgment by any lack of essential technical knowledge.'* It is significant that a government research program has carried us this far.

But authorities have expressed doubts about the economic feasibility of such a program. Studies at Stanford Research Institute** have indicated that effective shelter systems can be designed for costs which are small in comparison with our present total defense budget.

This fact can be illustrated by three nonmilitary defense programs. Each depends on a different shelter system: (1) maximum use of existing fallout shelter, (2) construction of special fallout shelters, and (3) construction

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* The Adequacy of Government Research Programs in Nonmilitary Defense, by the Advisory Committee on Civil Defense of the National Academy of Sciences and the National Research Council.

** For the Office of Civil and Defense Mobilization.

of special blast shelters in metropolitan areas and fallout shelters in non-metropolitan areas. About one-third the cost of the first two programs and one-half the third is in shelter. The remainder is for warning, decontamination, monitoring, stockpiling of food and fuel, and so on. These programs cover the range between the lower and upper limits of complete programs for protection and recovery...

Program 1 — Shelter in the first program fits the current government policy. The government is now urging the public to make maximum use of existing shelter — improving it where necessary — and to provide themselves with survival supplies. The average family investment would be about $200 and the cost to the government would be an additional $5 per family per year.

The government must act to make the individual's investment effective. For example, warning is essential, because without it no one would enter a shelter. (We have warning measures in most cities, but not in smaller communities where fallout shelters could be most effective.) Other necessary activities include: survey and marking of existing shelter in large buildings, monitoring of radiation hazards, public information, and so on. The cost of these to the government would be about one-half billion dollars. If the program were completed in two years, its annual cost to the government would be about $1.50 per person, contrasted with $230 per person for the present military budget.

This program could — if there were substantial public response — add 20 to 30 million survivors* over and above those who would survive without

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* 3/OST Underline.

it. For the next several years this would be adequate effectiveness in an attack against military targets -- but not against major population centers. It would be less than adequate in any attacks later on.

Program 2 would involve construction of special fallout shelters. In this case, the government would bear the cost of the shelters and the emergency supplies in addition to the expense of warning, monitoring, and the like. A program of this scope would cost on the order of $5 billion per year if completed in six years. This is equivalent to an annual cost of about $30 per person.

This plan would not seriously compete with any military program for manpower or resources. On the contrary, over the past few years, we have frequently had idle in the United States sufficient plant and personnel to undertake it without even pressing the economy (over 10 billion dollars worth in 1958). This program could add 60 to 90 million survivors* over and above the number who would survive with no program. It would provide adequate fallout protection in any attack on the United States at least through the 1960's. However, in attacks against population centers this program could not prevent millions of blast casualties.

Program 3 would provide maximum shelter against immediate blast effects in metropolitan areas plus fallout shelter elsewhere. If this program were to be completed in eight years, it would cost about $5 billion per year for the blast shelter portion of the program, but the fallout portion of the program would cost less because fallout shelters would no longer be needed in cities.

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* S/CST Underline.

The total annual cost would be $55 per person. This program would add approximately 80 million more survivors* than would be saved by a fallout shelter program, in the case of a heavy attack against military and population targets." (p. 182, 183)

b. Needed Measures.

Shelter, evacuation preparations, warning, stockpiling, etc.

4. Conclusion: "The United States cannot be defended, much less be victorious against an attacker, with any strategy that does not include an effective nonmilitary program. Many so-called 'impractical' protective measures do not become obsolete as quickly as complicated weapons systems. Furthermore, they are effective. Countless independently conducted studies, based on much more than mere arbitrary assumption, conclude that protective shelter can save many millions of American lives for a relatively low outlay of funds. Because it can, it should be an indispensable part of our country's policy of deterring an enemy attack." (p. 186)

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* S/CST Underline.

An Effective Shelter Program

Lt. Col. G. S. Waterman, USA, (Student Thesis No. 136), Industrial College of the Armed Forces, 30 April 1959. [Not Necessarily the Viewpoint of the Industrial College or of the Department of Defense]

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1. Type of Study: Extensive examination of the value of air raid shelter preparation, costs, present U.S. civil defense policy and a proposal policy.

2. Attitude and Argument: The writer favors a large U.S. civil defense effort, even at considerable cost. The major item advocated is a nationwide program of blast and fallout shelters.

The argument cites presumed mutually deterring attack forces of the U.S. and the USSR and then reasons that they require the augmentation of both active and passive defenses.

3. Civil Defense.

a. Example: "The present estimate for the United States is that from 20 to 90 million American deaths might occur mostly from direct blast and thermal effects if we are attacked now. Casualties could be reduced to from 10 to 30 million with 30-psi blast shelters. Attacks designed solely to use fallout, avoiding the active city defenses, could produce as many as 50 million deaths.

A nationwide system of fallout shelters would reduce civilian casualties to a level below 50 percent, even in the event of a large-city attack--with little warning. Although these would give little protection in presumed target areas, fallout shelters appear to be a 'best buy' for civil defense, for without them, even evacuation would be largely futile...

Tab E Ind. Col.

A technical study of hypothetical nuclear attack on the metropolitan area of St. Louis considers the possible effects of three attacks, utilizing one 20-MT weapon, four 5-MT weapons, or one 60-MT weapon, ideally placed and surface detonated in the St. Louis metropolitan area. The results of the study are given in table 18. (p. 105)

Table 18. St. Louis metropolitan area a/

Shelter design resistance (psi)	20-MT attack (percent survival)	Four 5-MT attacks (percent survival)	60-MT attacks (percent survival)
2	8	3	0
5	21	16	14
10	39	32	24
20	51	43	38
30	60	51	44
50	65	58	51
100	73	63	62

a/ U.S. Federal Civil Defense Administration, Survival in Public Shelters, 1957, pp. 3 and 23.

Washington receives two 10-MT weapons, and the fallout from 26 other large weapons from as far north as New York City. It was concluded that without adequate shelter 30 percent of the 1,677,000 population, or 500,000 would survive the initial blast, radiation, and thermal effects by utilizing the best shelter that is available. However, because of the lack of adequate

radiation shelter, the high levels of fallout intensity and the necessary slowness of rescue, only 330,000 of these could be rescued before being stricken with severe radiation effects." (p. 107)

b. Needed Measures: Stocked and equipped air raid shelters. (Blast and fallout resistant (30 psi) in likely target areas, fallout (1/1,000) in rural areas.) A "vigorous" civil defense plan, evacuation when advisable, stockpiling of food and supplies for recovery, training, and other measures are advocated peripherally.

4. Recommendations: "It is recommended that:

Federal civil defense legislation be redrafted to vest the basic responsibility for civil defense in the Federal Government, with the State and local governments having important supporting roles, ready to assume local control should communications failure or other circumstances require it.

The master plan for civil defense be pointed toward an integrated nationwide system based on a suitable shelter system, a strategic evacuation of women, children and unessential personnel from the target areas, and an equipped organization for peripheral help for stricken areas.

Detailed planning and studies proceed with the mission of implementing the master plan. That local civil defense offices develop and maintain complete plans including assignments of evacuees to places with proven capacity to provide housing, food, and sanitation, and above all--fallout shelter.

The Federal Government accept and assume the responsibility for initiating and pursuing to completion a fully planned national shelter policy.

The Congress legislate the funds and directive to institute an immediate and comprehensive study of all available shelter or potential shelter outside target areas, and plan to expend, progressively at first, funds to convert these to adequate (1,000 minimum attenuation) fallout shelters for the populations of those areas.

The Congress legislate without delay a requirement for the inclusion of suitable shelter in all new construction contracts, or as the minimum alternative, the provision through cooperation or arrangement of adjacent and adequate shelter. That all future structures be so provided with shelters at the expense of the individual, institution, corporation, industry, or local government, and that defrayment of a fair share of this expense be permitted through tax exemption from the costs of the national, federally financed public shelter program.

Legislation be written to require all industry to provide blast shelter at production plants, and that a fair amortization rate be allowed for tax purposes therefor.

The OCDM develop, especially for urban areas, a standard, large capacity shelter, utilizing all techniques possible to assure the economies of large-scale contract construction--such as reusable concrete moulds, standard electrical and auxiliary power equipment, and sanitary and air reprocessing equipment.

The blast resistance criterion in public blast shelter design be established at a minimum of 30 psi. That fallout shelters in small urban areas which may possibly become targets at a later date be built to be 'improvable' so that they can be strengthened to 30-psi blast resistance at minimal expense.

Immediate action be taken by the OCDM to develop an emergency, minimum subsistence ration of high storage life, high density, and low cost--using essentially surplus foods in Commodity Credit Corporation storage. Once developed, it is recommended that funds be provided to commence preparing, dispersing, and stockpiling not less than a 90-day emergency supply of food for the entire population as a postattack; recovery period ration to sustain life while transportation and distribution of food are restored." (p. 91, 92)